

## GROUP A

A group of widespread, closely related species, which includes *P. henrici* Diels, *P. humblotii* Drake ex Cavaco & Keraudren, *P. perrieri* Cavaco & Keraudren, and the newly described *P. sambiranensis* Capuron ex Le Thomas & Schatz below, is well characterized by the presence of domatia in the form of tufts of golden-ferruginous hairs in the axils of the secondary veins with the midrib on the lower lamina surface. In addition, petals are narrowly elliptic to oblong-elliptic with a length to width ratio of 2-2.5 : 1; the number of carpels varies from 20-40, with a globose to obconic stigma that is finely tuberculate-papillate with a shallow medial crease; and the monocarps are ellipsoid and short apiculate.

Distinguishing individual species among the group is somewhat problematical, and is based on a combination of characters including pubescence and presence of lenticels on the young branches, the texture of leaves, and the length of the pedicel. Widespread throughout the west, and occurring on both calcareous "tsingy" and sand substrates, *P. henrici* is distinguished by densely pubescent young branches and a short pedicel. Endemic to Anjouan, the Comores, *P. humblotii* has glabrous young branches, a long pedicel, and the largest petals among the group. Described from coastal forest on sand near Vohemar, *P. perrieri* exhibits the least well developed domatia, and conspicuous lenticels on the young branches. Two CAPURON collections from the northwest on the Sahafary Plateau (*SF 20977*, *SF 24512*) probably represent *P. perrieri*, and if so, fruit can now be described as: monocarps ellipsoid, 9 mm long × 6 mm in diameter, short apiculate, the stipe short, stout 2-3 mm long, the pedicel elongating to 20 mm in fruit. A recent collection from the Masoala Peninsula (*Schatz 2886*) with densely pubescent young branches and long pedicels may represent a new species, but fruiting material is desired prior to description.

The recently described *P. verdcourtii* Vollesen (1980) from Tanzania in all likelihood belongs with the above group, as it is the only other *Polyalthia* species in the African-Malagasy region possessing domatia.

***Polyalthia sambiranensis*** Capuron ex Le Thomas & Schatz, *sp. nov.* — Fig. 1, 1-6; 3, 1-4.

*A madagascariensibus speciebus foliorum pagina inferiore domatiis munita differt ramis juvenilis glabris, haud lenticellis, foliis magnis chartaceis, pagina superiore nitida et petalis oblongis.*

Tree 10-15 m tall, the young branches glabrous. Leaves chartaceous, long elliptic, (4.5-)8-22.5 cm long, (1.5-)2.8-7.6 cm broad, the apex long acuminate, the base cuneate to attenuate, the petiole 4.6 mm long, glabrous, the upper and lower surface glabrous, the upper surface lustrous, the lower matte, the venation weakly brochidodromous to camptodromous with 10-12 pairs of major secondary veins and conspicuous domatia consisting of tufts of golden-ferruginous hairs in the axils of the secondary veins, the midrib flattened above and slightly broader toward the base, conspicuously elevated below, the secondary and tertiary venation slightly elevated above and below.

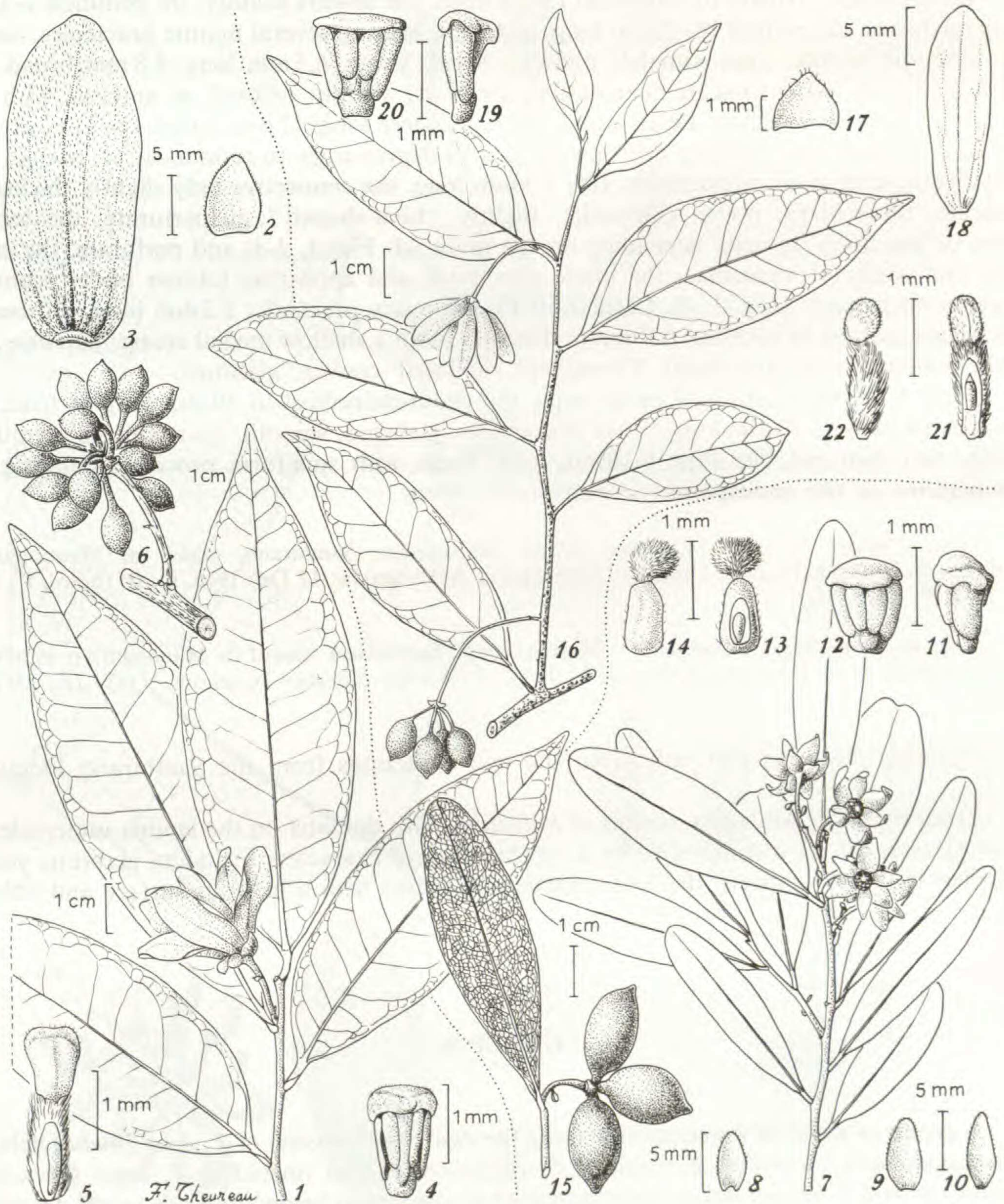


Fig. 1. — *Polyalthia sambiranensis* : 1, flowering branch ; 2, sepal ; 3, petal ; 4, stamen in face view ; 5, carpel with the ovary cut longitudinally ; 6, fruit (SF 24836). — *Polyalthia angusti-elliptica* : 7, flowering branch ; 8, sepal ; 9, inner petal ; 10, outer petal ; 11-12, stamen in face view and profile ; 13, ovary cut longitudinally ; 14, carpel (SF 18237) ; 15, fruiting branch (SF 9181). — *Polyalthia pendula* : 16, flowering and fruiting branch ; 17, sepal ; 18, petal ; 19-20, stamen in profile and face view ; 21, ovary cut longitudinally ; 22, carpel (SF 20530).

Inflorescences axillary to somewhat ramiflorous, the flowers solitary, the peduncle 2-3 mm long, glabrous, the pedicel 10-12 mm long, glabrous, bearing several minute bracteoles, one at the base and another approximately midway. Sepals ovate, 6.5 mm long, 4.8 mm broad, the apex acute, the base truncate to concave, glabrous, slightly reflexed at anthesis with the margins somewhat recurved. Petals equal, oblong, 26 mm long, 12 mm broad, the apex obtuse, the base rounded and abruptly bent inward at a 90 degree angle to form a cavity, orange-red, very finely puberulous. Stamens ca. 100, 1.3 mm long, the connective only slightly thickened, truncate, tuberculate; pollen ellipsoidal, slightly "boat-shaped", inaperturate, the tectum more or less finely areolate depending on the grain (cf. Fig. 3, 1-3) and perforate, the exine very thin, without columellae, the intine very thick and appearing tubular under scanning electron microscopy (Fig. 3, 4). Carpels 30-40, the ovary prismatic, 1.2 mm long, pubescent, the stigma globose to obconic, 0.8 mm in diameter, with a shallow medial crease, papillate, the ovule solitary, appearing basal. Torus very shallowly convex, glabrous.

Fruit a cluster of stipitate monocarps, the peduncle/pedicel to 30 mm long in fruit, the monocarps oblong, 10 mm long, 5 mm in diameter, glabrous, smooth, short apiculate, initially yellow and then red, the stipe 6-16 mm long. Seeds with spiniform processes entering the ruminations of the endosperm.

TYPE : *Service Forestier (Capuron) 24836*, Madagascar, Sambirano, massif de Manongarivo, confluent de l'Antsahabe entre Djangoa (Ambanja) et Ankaramybe, 12 Dec 1966, fl., fr. (holo-, P; iso-, K, MO, P, TEF, U).

ADDITIONAL MATERIAL EXAMINED. — MADAGASCAR : Sambirano, massif de Manongarivo, confluent de l'Antsahabe et de l'Antsehankolana, Nov 1954, fr., *Service Forestier (Capuron) 11481* (K, MO, P, TEF).

DISTRIBUTION : Known only from the two collections from the Sambirano Domain.

From the other Malagasy species of *Polyalthia* with domatia on the lamina underside, *P. sambiranensis* can be distinguished by a combination of characters including glabrous young branches that lack lenticels, the large chartaceous leaves with a lustrous surface and oblong petals.

## GROUP B

A group of small-flowered species along the east coast consists of *P. emarginata* Diels, *P. madagascariensis* Cavaco & Keraudren, *P. chapelieri* Baillon (including *P. lamii* Cavaco & Keraudren and *P. lucens* Baker, both proposed in synonymy below) and the newly described *P. angusti-elliptica* Schatz & Le Thomas. The group is foremost characterized by sepals that are relatively long in relation to the petals, the petals not exceeding twice the length of the sepals. In addition, there is a tendency for an emarginate leaf apex; secondary venation that is little or no more well developed than the tertiary venation; the inner petals slightly narrower than the outer petals; a globose, densely pubescent stigma with the stigmata loosely fused into

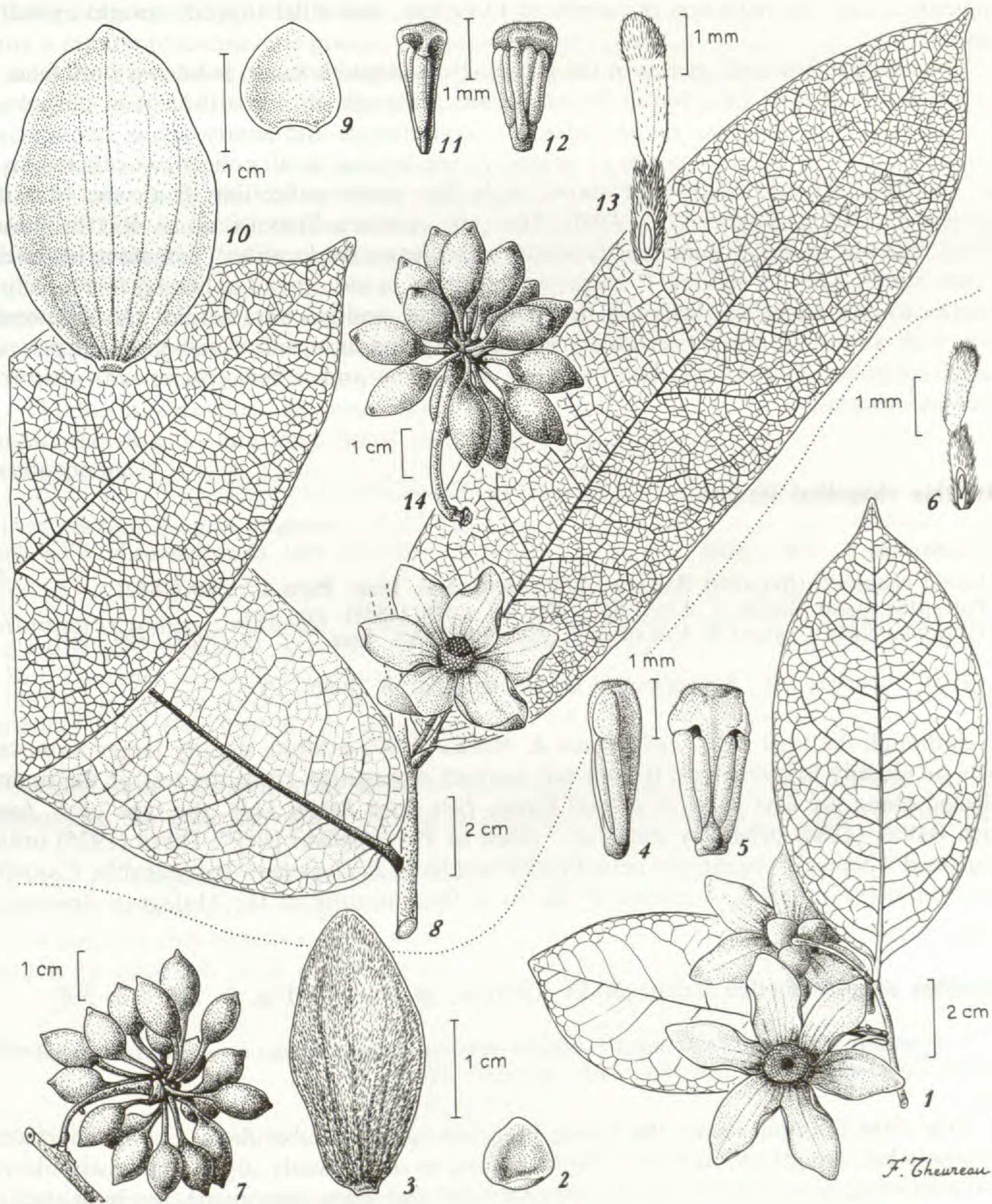


Fig. 2. — *Polyalthia multistamina* : 1, flowering branch; 2, sepal; 3, petal; 4-5, stamen in profile and face view; 6, carpel with ovary cut longitudinally (RN 9764); 7, fruit (Cours 3171). — *Polyalthia keraudrenii* : 8, flowering branch; 9, sepal; 10, petal; 11-12, stamen in profile and face view; 13, carpel with ovary cut longitudinally; 14, fruit (SF 22117).

a stigmatic head; the reduction of carpels to 13 or less; and a flat-topped, upright cylindrical torus.

The smallest flowered species in the group, *P. madagascariensis*, is known only from the type just north of Fort Dauphin in littoral forest. Although also described from purportedly littoral forest, *P. emarginata*, distinguished by large flowers and nearly sessile non-apiculate monocarps, is more likely a species of upland forest, insofar as all collections other than the type are from 500 m altitude and above, including recent collections from the Massif of Marojejy at 1300 m (*Miller 3527, 4100*). The type carries a PERRIER DE LA BÂTHIE number (14910), but was in fact “donné par GOUDET”, and hence the locality “Tamatave litorale” is of some doubt. Another species, *P. chapelieri*, however, is widespread in littoral forest from Ft. Dauphin to Maroantsetra including Ile Sainte Marie, and is characterized by oblanceolate leaves with almost no visible secondary and tertiary venation, more numerous carpels, and distinctly stipitate monocarps. The following synonymy and a new species with distinctive leaves are proposed.

### ***Polyalthia chapelieri* Baillon**

*Adansonia* 8 : 349 (1868).

— *Unona chapelieri* (BAILLON) BAILLON, Bull. Mens. Soc. Linn. Paris 1 : 338 (1882).

— *Polyalthia lucens* BAKER, J. Linn. Soc., Bot. 21 : 318 (1884), *syn. nov.*

— *Polyalthia lamii* CAVACO & KERAUDREN, Bull. Jard. Bot. Etat 27 : 76 (1957), *syn. nov.*

TYPE : *Chapelier s.n.*, Madagascar : Est, s. loc., n.d., fl. (holo-, P).

Although the type of *P. lamii* (*Lam & Meeuse 6047*) exhibits slightly larger monocarps borne on slightly longer stipes, it does not warrant segregation from the rest of the material collected along the east coast in littoral forest. Nor does *Baron 3116*, the type of *P. lucens*, which BAKER (1884) originally stated as “allied to *P. chapellieri* [sic]”. DIELS (1925) initially questioned whether *P. lucens* was actually different from *P. chapelieri*. Inexplicably, CAVACO & KERAUDREN (1958) failed to include *P. lucens* in their account of the Malagasy *Annonaceae*.

### ***Polyalthia angusti-elliptica* Schatz & Le Thomas, *sp. nov.* — Fig. 1, 7-15; 3, 5-6.**

*P. chapelieri affinis, sed foliis anguste elliptico-oblongis, utraque pagina nerviis leviter prominentibus, carpellis 2-6 et monocarpis conspicue longe apiculatis differt.*

Tree 10 m tall and above, the young branches sparsely puberulous. Leaves chartaceous and somewhat coriaceous, narrowly elliptic-oblong to occasionally slightly narrowly obovate, 2.8-6.3 cm long, 0.8-1.7 cm broad, the apex rounded and often emarginate, the base attenuate with the lamina decurrent along the petiole, the petiole 1-2 mm long, sparsely puberulous, the upper and lower surfaces glabrous, lustrous, the lower surface verruculose, the venation weakly brochidodromous to camptodromous with 7-10 pairs of major secondary veins, which however are only slightly more evident than the tertiary venation, both the secondary and tertiary venation slightly elevated above and below.

Inflorescences axillary, the flowers solitary, the peduncle 2 mm long, sparsely puberulous, bearing a minute bracteole, the pedicel 6-10 mm long, glabrescent, bearing a larger bract 2 mm long near the base. Sepals ovate, 5.1-5.5 mm long, 3.0-3.5 mm broad, the apex acute, the base truncate to concave, glabrous, the margin sparsely ciliate. Petals subequal, ovate, 8-9 mm long, 3-4 mm broad, the inner petals slightly narrower, the apex acute, the base rounded and abruptly bent inward at a 90 degree angle forming a cavity, the inner and outer surfaces glabrous. Stamens ca. 40, 1.1 mm long, the connective slightly thickened, truncate; pollen ellipsoidal, "boat-shaped", monosulcate, the aperture elongate, extending across the entire width of the grain, the tectum smooth and perforate, the exine columellar (Fig. 3, 5-6). Carpels 2-6, the ovary prismatic, 1 mm long, sparsely pubescent, the stigma globose, 0.4 mm in diameter, densely strigose, the stigmata loosely fused together into a stigmatic head, the ovule solitary, appearing basal. Torus short cylindrical, truncate, glabrous.

Fruit a cluster of shortly stipitate monocarps, the monocarps ellipsoid-oblong, 19 mm long, 11 mm in diameter, glabrous, somewhat verrucose, the apex conspicuously long apiculate, the stipe 2-3 mm long. Seeds with spiniform processes entering the ruminations of the endosperm.

TYPE : *Service Forestier (Capuron) 18237*, Madagascar : Est, environs de la Baie d'Antongil, restes de forêt à l'W. d'Anandrovola, vers 100-150 m d'altitude, 11 Sept 1957, fl., fr. (holo-, P; iso-, K, MO, TEF).

ADDITIONAL MATERIAL EXAMINED. — MADAGASCAR, Est : Restes de forêt à l'W. d'Anandrivola, sur la piste d'Ancua, vers 100 m d'alt., Mar 1954, fr., *Service Forestier (Capuron) 9181* (MO, P, TEF); environs de la Baie d'Antongil, massif de Farankaraina, entre Navana et Andranofotsy, de 9 à 150 m d'altitude, 20 Sept 1957, fl., fr., *Service Forestier (Capuron) 18354* (MO, P, TEF); Antanambe, au Sud de Mananara, sur latérites, 10-14 Nov 1964, fl., fr., *Service Forestier (Capuron) 23762* (MO, P, TEF).

DISTRIBUTION : Known from south of Mananara to just east of Maroantsetra, an arc encompassing the area just south of, and extending to the head of, the Bay of Antongil.

From *P. chapelieri*, its probable sister species, *P. angusti-elliptica* can be easily distinguished by its narrowly elliptic-oblong leaves with slightly raised venation, the secondary venation fine and only slightly more developed than the tertiary venation, and by the reduction in carpels to only 2-6, with conspicuously long apiculate monocarps.

### GROUP C

The largest group of *Polyalthia* in Madagascar includes *P. ghesquiereana* Cavaco & Keraudren, *P. capuronii* Cavaco & Keraudren, *P. oligosperma* (Danguy) Diels, *P. heteropetala* (Diels) Ghesq., *P. richardiana* Baillon (including *P. dielsii* Cavaco & Keraudren, proposed in synonymy below), and *P. humbertii* Cavaco & Keraudren (including *P. leandrii* Cavaco & Keraudren, proposed in synonymy below). They are characterized principally by long, narrowly oblong to linear petals with a length to width ratio of 7-10 : 1, the inner petals

sometimes slightly narrower and longer. The densely pubescent stigma is obconic to napiform with a shallow medial crease and is attached laterally to the ovary.

The two species with the longest petals, *P. capuronii* and *P. ghesquiereana*, are extremely closely related and should perhaps be merged. Although no type was designated in the original publication of *P. ghesquiereana* (CAVACO & KERAUDREN, 1957), "type" stickers are attached in the Paris herbarium to *Service Forestier 12910* from Farankaraina near Maroantsetra, and it is here accepted as the type in lieu of lectotypification. The type of *P. capuronii* is from just north of Fort Dauphin, 1000 km to the south. A recent collection from near the type locality (*Schatz 2651*) permits the description of fruit : monocarps ellipsoid, 21 mm long  $\times$  15 mm in diameter when fresh, 15 mm long  $\times$  9 mm in diameter when dry, the apex rounded, the stipe 8-9 mm long. On Nosy Mangabe, just opposite the type locality of *P. ghesquiereana*, flowers are abundant along the branches, the petals yellow at anthesis. Whereas, in the Fort Dauphin region, flowers are sparse along the branches, and petals are green to yellowish-green at anthesis. A number of collections from the Tampolo region north of Fenerive are difficult to assign to one or the other species. Further field work is necessary before a decision to merge the species can be made.

Distinguished by narrowly ovate to lanceolate and somewhat falciform leaves, *P. oligosperma* is an upland species of the escarpment forests, also known from Mt. d'Ambre in the north. Another complex occurring in the upland escarpment forests is represented by *P. humbertii* and *P. leandrii*, characterized by broadly to narrowly elliptic leaves with evident, slightly raised tertiary venation. Both were originally described without fruit, and additional collections display a continuum in leaf width as well as monocarp size, and engender the proposed synonymy.

### ***Polyalthia humbertii* Cavaco & Keraudren**

Bull. Jard. Bot. Etat 27 : 76 (1957).

— *Polyalthia leandrii* CAVACO & KERAUDREN, Bull. Jard. Bot. Etat 27 : 76 (1957), *syn. nov.*

TYPE : *Service Forestier (Capuron) 8792*, Madagascar, est, environs du col d'Atondradama, entre les bassins de la Mahalevona et de la Sahafihitra, au Nord de la presqu'île Masoala, 600 m d'altitude, 25 Dec 1953, fl. (holo-, P; iso-, MO, P, TEF).

With a type consisting of multiple duplicates (*Service Forestier (Capuron) 8792*), *P. humbertii* has been chosen over *P. leandrii*. Fruit can now be described as : monocarps ellipsoid-oblong, 12-19 mm long  $\times$  7-10 mm in diameter, the apex obtuse to rounded, the stipe 6-10 mm long and laterally attached to the monocarp. In certain respects, *P. humbertii* appears transitional to species of Group B.

Unfortunately misnamed, *P. heteropetala* is easily distinguished by its large, broadly ovate, foliaceous sepals, mistaken by both DIELS (1925) in his original description of *Fenerivia*, and CAVACO & KERAUDREN (1958) for an additional whorl of petals. The so-called "*subquadrato-disciformis*" calyx referred to in the original description is in fact merely the base of the receptacle, less contracted in the drying process than the rest of the receptacle. The question of whether the proliferation of petals to 9 or 10 is, or is not, a characteristic feature of the species, as opposed to an aberrant condition, awaits the collection of additional material.

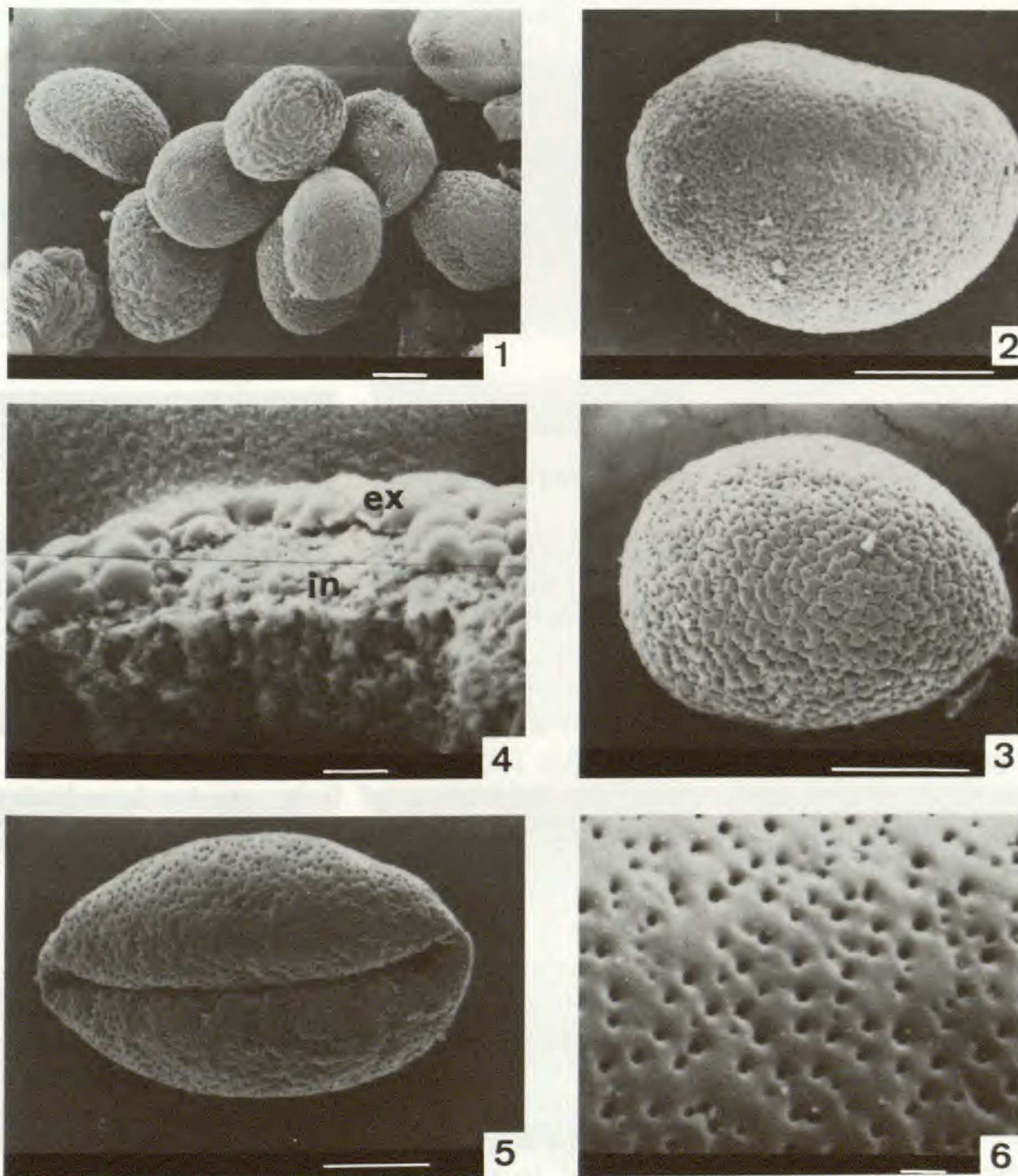


Fig. 3. — *Polyalthia sambiranensis* : 1, assemblage of pollen grains (SEM) showing intraspecific variation in the ornamentation of the exine; 2, grain with finely areolate tectum; 3, grain with more coarse areolate tectum; 4, fracture of the sporoderm showing areolate tectum, thin exine lacking columellae, and thick, tubular intine. — *Polyalthia angusti-elliptica* (SEM) : 5, monosulcate "boat-shaped" grain; 6, smooth psilate-perforate tectum. Scale bar : 1, 2, 3, 5 = 10  $\mu$ m; 4, 6 = 1  $\mu$ m.



Finally, the group is represented in the Sambirano Domain by a species with long elliptic (and *not* falciform as stated by CAVACO & KERAUDREN, 1958) leaves, with virtually no visible secondary or tertiary venation, and a slightly ribbed pedicel when dry. The two species involved, *P. richardiana* and *P. dielsii*, are indistinguishable, the types both collected on Nosy Be, and thus the following synonymy is proposed.

***Polyalthia richardiana* Baillon**

*Adansonia* 8 : 350 (1868).

— *Unona richardiana* (BAILLON) BAILLON, Bull. Mens. Soc. Linn. Paris 1 : 339 (1882).

— *Polyalthia dielsii* CAVACO & KERAUDREN, Bull. Jard. Bot. Etat 27 : 77 (1957), *syn. nov.*

TYPE : *Richard s.n.*, 1840, Madagascar, Nossi-Bé, hortulanus borbonicus, fr. (lecto-, P, here designated).

**GROUP D**

A group of large-leaved species along the east coast, including *P. decora* Diels and the newly described *P. keraudrenii* Le Thomas & Schatz and *P. multistamina* Schatz & Le Thomas below, is characterized by : well developed secondary venation; large elliptic petals with a length to width ratio of 2 : 1; long stamens with a thickened papillate connective; an increase in the number of carpels (over 60); and an elongate, prismatic style/stigma with a pubescent apical stigmatic surface. A recent collection (*Schatz 1859*) probably represents the second collection of *P. decora* and permits the description of fruit : peduncle/pedicel slender, elongating to 31 mm in fruit, the monocarps ellipsoid, 9 mm long  $\times$  7 mm in diameter, acute, the stipe slender, 9 mm long.

***Polyalthia keraudrenii* Le Thomas & Schatz, *sp. nov.* — Fig. 2, 8-14; 4, 8-9.**

*P. multistamina affinis, sed foliis majoribus, oblongis et staminibus minus numerosis.*

Large shrub, the young branches glabrous. Leaves membranaceous to chartaceous, somewhat stiff coriaceous, oblong to oblong-elliptic, 16.5-27.6 cm long, 3.7-8.5 cm broad, the apex acuminate, the base obtuse-rounded to slightly sub-cordate, occasionally somewhat inaequilateral, the margin involute, the petiole stout, canaliculate, glabrous, 4-6 mm long; the upper surface glabrous, lustrous, the lower surface glabrous, matte; venation weakly brochidodromous to camptodromous with 8-12 pairs of major secondary veins, the midrib slightly recessed above, distinctly elevated below, the secondary and tertiary venation slightly elevated above and below.

Inflorescences axillary, the flowers solitary, the peduncle 1-2 mm long, the pedicel 18-23 mm long, glabrous, bearing a minute bracteole approximately midway. Sepals broadly

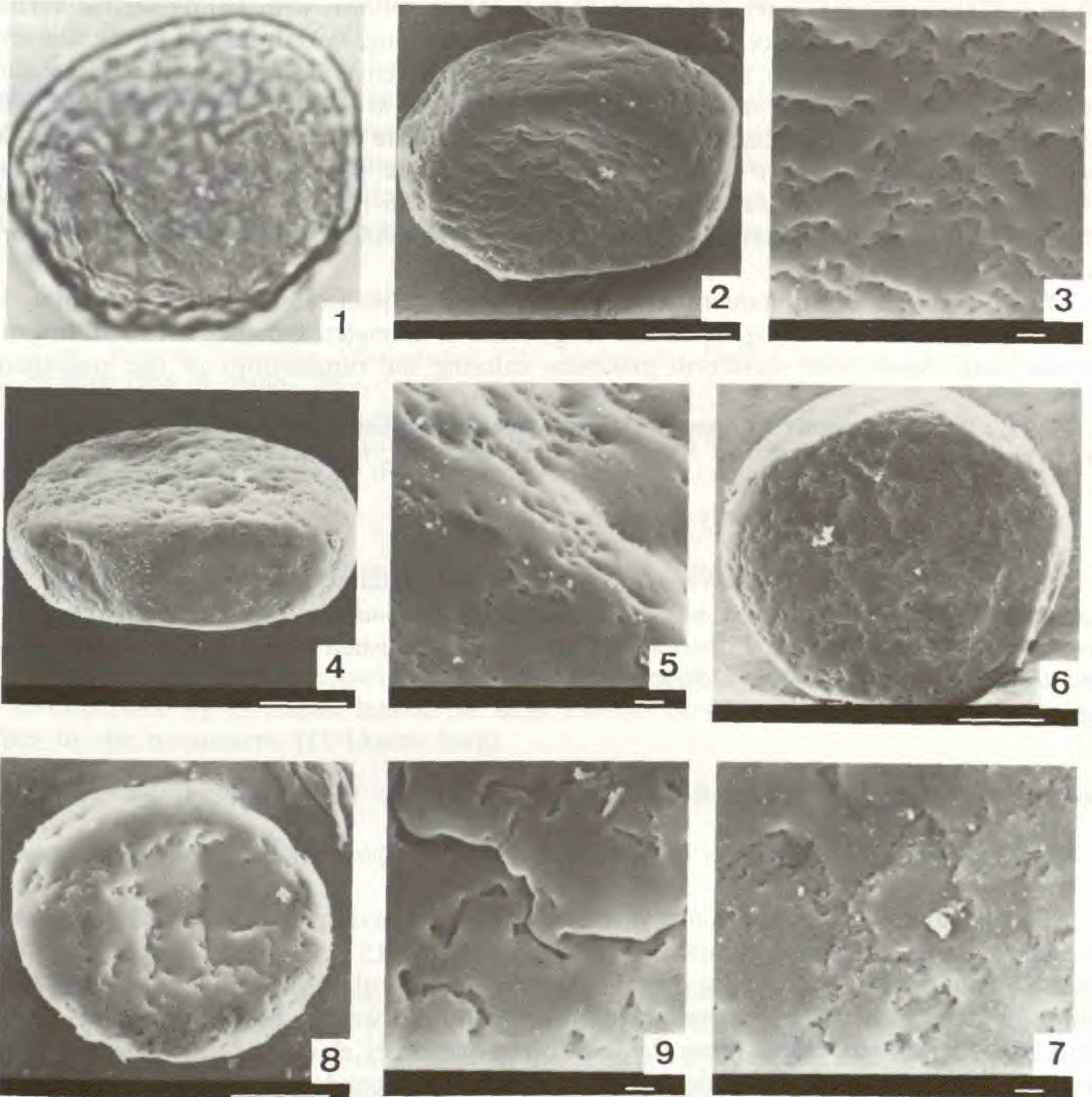


Fig. 4. — *Polyalthia multistamina* : 1, an optical plane of an inaperturate pollen grain in LM, showing the different thicknesses of the exine at the two poles ( $\times 1000$ ); 2, pollen grain (SEM) with an inclination of the plate at  $60^\circ$  showing the areolate-perforate face; 3, detail of areolate-perforate tectum; 4, same grain, with an inclination of the plate at  $0^\circ$ ; 5, detail of the surface showing the transition between the two types of ornamentation; 6, same grain, with a rotation of the plate of  $180^\circ$  showing the scabrous and perforate face; 7, detail of the scabrous, perforate tectum. — *Polyalthia keraudrenii* (SEM) : 8, inaperturate pollen grain; 9, detail of the areolate-perforate surface. Scale bar : 2, 4, 6, 8 =  $10\mu\text{m}$ ; 3, 5, 7, 9 =  $1\mu\text{m}$ .

ovate, 8 mm long and broad, the apex acute to obtuse, reflexed at anthesis, the base concave, the inner and outer surfaces glabrous. Petals elliptic, 27 mm long, 16 mm broad, the apex acute to obtuse, the base acute and abruptly bent inward at a 90 degree to form a cavity, dark wine red (*vide* CAPURON), the inner and outer surfaces tomentellous, with faintly visible vertical striations on the inner surface. Stamens ca. 200, 2.3 mm long, 0.2 mm broad at the filament, which is 0.3 mm long, 1 mm broad at the connective, which is 0.2 mm thick, truncate, and minutely tuberculate; pollen subspherical, slightly flattened at the two poles, inaperturate, the exine very thin, non-columellar, the tectum areolate-perforate with very flat areoles, the pollen resembling greatly that of *P. multistamina* in its areolate part. Carpels 35-60, the ovary prismatic, 1.4-1.6 mm long, the style/stigma elongated to 1.6-1.8 mm long, prismatic, the apex (stigmatic surface) somewhat clavate, papillate; ovule solitary, appearing basal. Torus shallowly convex, glabrous.

Fruit a cluster of stipitate monocarps, the peduncle/pedicel elongating to 35 mm, the monocarps ellipsoid to oblong, 16-18 mm long, 9 mm in diameter, the apex rounded, the stipe 6-8 mm long. Seeds with spiniform processes entering the ruminations of the endosperm.

TYPE : *Service Forestier (Capuron) 22117*, Madagascar : Est, forêt sublittorale, sur sables, à Tampolo, au nord de Fénériver, 25 Nov 1962, fl., fr. (holo-, P; iso-, K, MO, P, TEF).

DISTRIBUTION : Known only from the type locality.

The species epithet "*keraudrenii*" honors the late Madame KERAUDREN-AYMONIN, who significantly advanced our knowledge of the Malagasy *Annonaceae*. From *P. multistamina*, the species most closely related, *P. keraudrenii* can be distinguished by its larger, oblong leaves, and by shorter stipes to the monocarps.

***Polyalthia multistamina*** Schatz & Le Thomas, *sp. nov.* — Fig. 2, 1-7; 4, 1-7.

*P. keraudrenii* affinis, sed foliis ellipticis, monocarpiorum stipite longiore et staminibus plurimis.

Shrub 4 m tall to tree, the young branches glabrous. Leaves membranaceous to somewhat chartaceous and coriaceous, elliptic to slightly obovate, 7.8-15.4 cm long, 3.1-6.7 cm broad, the apex acuminate, the base acute to obtuse, the petiole canaliculate, 4-5 mm long, the upper and lower surfaces glabrous, the venation camptodromous to weakly brochidodromous with 9-13 pairs of major secondary veins, the midrib conspicuously elevated below, flattened above and becoming increasingly broader toward the base, the secondary venation slightly elevated above and below, as is the tertiary venation but somewhat less so.

Inflorescence axillary, the flowers solitary, the peduncle 3-4 mm long, glabrous, the pedicel 18-26 mm long, glabrous, bearing one to several minute bracteoles toward the base. Sepals fused at their base, triangular, 6-7 mm long and broad, the apex acute, the base truncate, glabrous. Petals subequal, elliptic, 28 mm long, 14 mm broad, the apex acute to obtuse, the base acute, the base of the outer petals narrowed to a very short claw, the base of the inner petals abruptly bent inward at a 90 degree angle to form a cavity, the margin of the inner petals slightly recurved, the inner and outer surfaces finely puberulous, with faint vertical

striations visible on the inner surface. Stamens ca. 250, 3 mm long, the filament 0.2 mm long, the thecae 2 mm long, and the connective vertically thickened to 0.8 mm, somewhat pyramidal, papillate, the pollen subspherical, slightly flattened at the two poles, apparently inaperturate but with two differing zones of ornamentation present : one scabrous and perforate with a very thin exine (Fig. 4, 6-7), the other very flat areolate and perforate with a thicker exine (Fig. 4, 2-3), the exine non-columellar. Carpels ca. 70, the ovary prismatic, 1.3 mm long, pubescent, the stigma vertically elongated into a style/stigma, prismatic, 1.3 mm long, sparsely tomentellous along the sides, densely strigose at the apex, the ovule solitary, appearing basal.

Fruit a cluster of stipitate monocarps, the peduncle/pedicel elongating to 20-30 mm long, the monocarps ellipsoid, 14 mm long, 6 mm in diameter, the apex short apiculate, the stipe 11-15 mm long. Seeds with spiniform processes entering the ruminations of the endosperm.

VERNACULAR NAME : "Hazoambo"

TYPE : *Réserves Naturelles (Silasy André) 9764*, Madagascar, District Sambava, Canton Maroambihy, 13 Sept 1958, fl. (holo-, P).

ADDITIONAL MATERIAL EXAMINED. — MADAGASCAR : District Sambava, Canton Maroambihy, n.d., fl., *Réserves Naturelles (Sajy) 9583 (P)*; Montagne de Ambohimarangitra, vers 450 m, 31 Dec. 1948, fr., *Cours 3171 (K, MO, P, U)*.

DISTRIBUTION : Known from the northeastern wet forests southwest of Sambava in the drainage of the Lokoho River.

From the species most closely related, *P. decora* and *P. keraudrenii*, *P. multistamina* can be distinguished by its elliptic leaves, the large number of stamens (ca. 250), and the longer stipes to the monocarps (11-15 mm long).

## GROUP E

The newly described *P. pendula* below is not referable to any of the informal groups outlined above. Along with the glaucous underside of the leaves, the very slender pedicel, the extremely small sepals relative to the petals, the oblong-elliptic petals with a length to width ratio of 3 : 1, and a globose, sparsely papillate stigma with a shallow medial crease set *P. pendula* well apart from the rest of Malagasy *Polyalthia*, and render its affinities uncertain. Palynologically, *P. pendula* most closely resembles *P. decora*, which suggests a possible relationship to species of Group D.

***Polyalthia pendula*** Capuron ex Schatz & Le Thomas, *sp. nov.* — Fig. 1, 16-22; 5, 1-3, 7.

*Species foliorum pagina inferiore glauca, sepalis minutissimis, pedicello longo, gracile penduloque insigna.*

Shrub (climbing? *fide* CAPURON), the young branches slender, glabrous, finely lenticellate. Leaves chartaceous and somewhat coriaceous, narrowly elliptic to narrowly ovate, occasionally slightly falciform, 2.6-8.6 cm long, 0.9-3.3 cm broad, the apex acute to acuminate, the base cuneate to attenuate and somewhat asymmetric, the petiole slender, 4-7 mm long, the margin involute, the upper surface glabrous, the lower surface somewhat glaucous, the venation weakly brochidodromous to camptodromous with 5-8 pairs of major secondary veins, the midrib distinctly elevated below, the secondary and tertiary venation slightly elevated above and below.

Inflorescences axillary or borne on slightly larger branches just behind the leaves in the axils of fallen leaves, the flowers solitary or rarely geminate, pendulous. Peduncle 1-2 mm long; pedicel very slender, thickening slightly towards the apex, 18-48 mm long, glabrous, bearing a minute bracteole at the base. Sepals transversely broadly triangular, 1.2 mm long, 1.6 mm broad, the apex acute, the base truncate, the inner and outer surfaces glabrous, the margin very sparsely ciliate. Petals equal, narrowly oblong-elliptic, 15 mm long, 5 mm broad, the apex obtuse to rounded, the base obtuse and abruptly bent inward at a 90 degree angle forming a cavity, the inner and outer surfaces glabrous, with faintly visible vertical striations on the inner surface. Stamens ca. 40, 1.2 mm long, 0.3 mm broad at the base of the short filament, 1 mm broad at the truncate, slightly thickened connective which is minutely tuberculate; pollen heteropolar, slightly conical, inaperturate, the tectum strongly areolate and perforate (Fig. 5, 7), the intine slightly thickened with the planar face probably distal, the pollen very similar to that of *P. decora*. Carpels to 10, the ovary prismatic, 1.2 mm long, pubescent, the stigma globose, 0.4 mm in diameter, with a shallow medial crease, papillate; the ovule solitary, appearing basal. Torus shallowly convex, glabrous.

Fruit a cluster of 1-8 stipitate monocarps, the monocarps ellipsoid, 8 mm long, 6 mm in diameter, glabrous, smooth, the apex very slightly apiculate, the stipe slender, 5-8 mm long. Seeds with spiniform processes entering the ruminations of the endosperm.

TYPE : *Service Forestier (Capuron) 20530*, Madagascar : Sud-Est, Vinanibe, près de Fort Dauphin (sur sables), 10 Dec 1961, fl., fr. (holo-, P; iso-, K, MO, P, TAN).

DISTRIBUTION : Known only from the type locality.

Additional material of *Polyalthia* from Madagascar has made possible the recognition of five new species, and the grouping of species into informal "species groups" based upon macromorphological characters. Examination of pollen of the new taxa, as well as previously recognized taxa, reveals pollen types distinct from the monosulcate type formerly described for Malagasy *Polyalthia* (LE THOMAS, 1980/81; ROGSTAD & LE THOMAS, 1989), and corroborates the delineation of "species groups". At least three different clades can be identified within Malagasy *Polyalthia* : the first, represented by species of Group A, is characterized by domatia on the lamina underside, and ellipsoidal, inaperturate pollen with a non-columellar exine; the

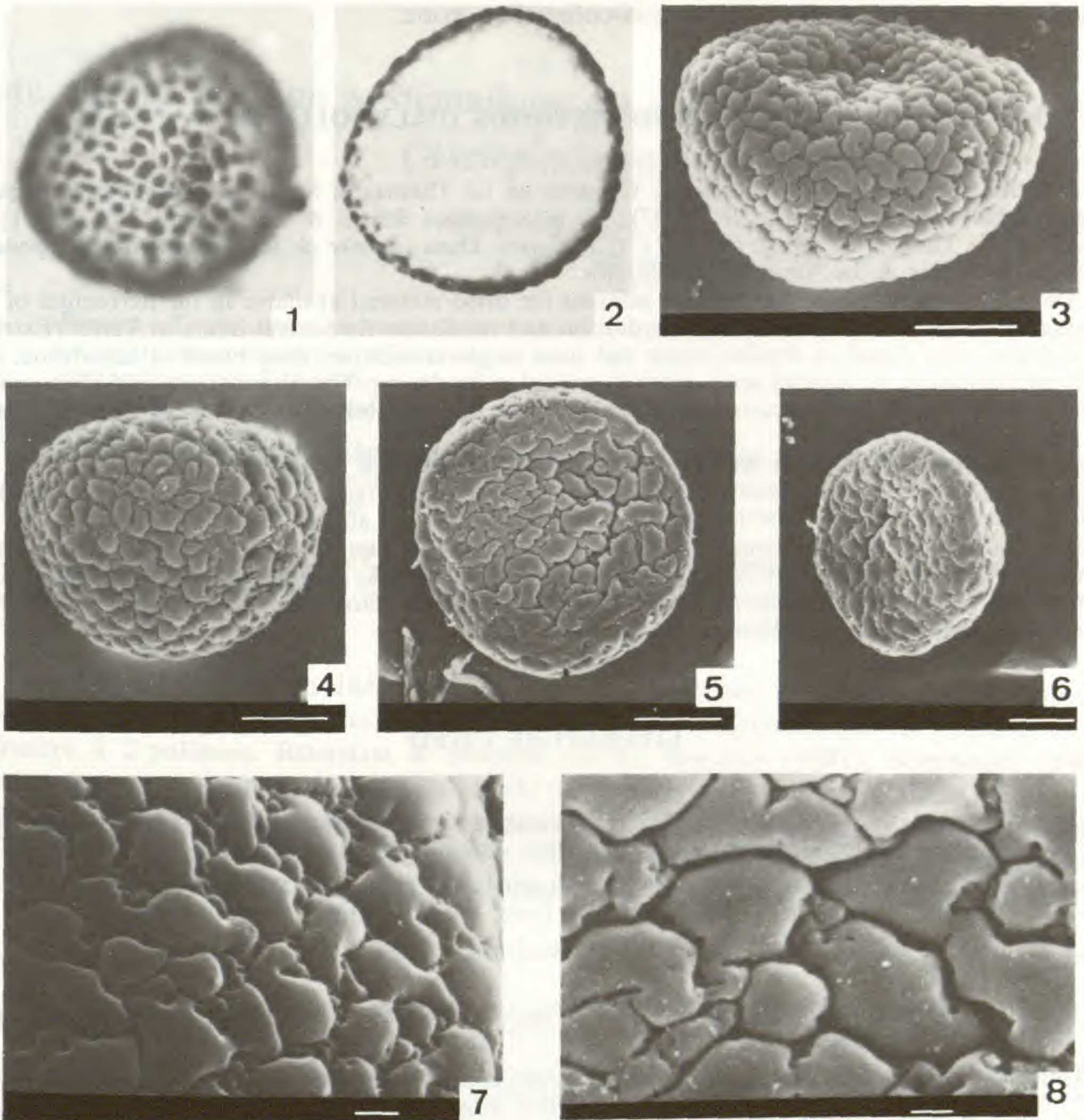


Fig. 5. — *Polyalthia pendula* : 1-2, surface view and optical plane of an inaperturate grain in LM ( $\times 1000$ ); 3, inaperturate, slightly conical pollen grain in profile view (SEM); 7, same grain, detail of the coarsely areolate-perforate tectum. — *Polyalthia decora* (SEM) : 4, inaperturate, slightly conical pollen grain in profile view; 5, same grain, view of the flat (distal?) face; 6, same grain, three-quarter view; 8, detail of the tectum showing very coarse areoles, and rare perforations. Scale bar : 3, 4, 5, 6 =  $10\mu\text{m}$ ; 7, 8 =  $1\mu\text{m}$ .

second, represented by species of Group B and C, is characterized by monosulcate, boat-shaped pollen with a well-developed columellar exine; and the third, represented by species of Group D and E, is characterized by subspherical and slightly flattened at the poles, to slightly conical, inaperturate pollen with a non-columellar exine.

## MATERIAL AND METHODS (PALYNOLOGY)

MATERIAL STUDIED : *P. sambiranensis* Capuron ex Le Thomas & Schatz (SF 24836); *P. angust elliptica* Schatz & Le Thomas (SF 18237); *P. multistamina* Schatz & Le Thomas (RN 9583); *P. keraudrenii* Le Thomas & Schatz (SF 22117); *P. decora* Diels (Perrier de la Bâthie 4974); *P. pendula* Capuron ex Schatz & Le Thomas (SF 20530).

The palynological study was realized utilizing the dried material available in the herbarium of the National Muséum in Paris. Following rehydration and reinflation for several hours in Tetral (Extran), pollen grains were rinsed in distilled water and fixed in glutaraldehyde, then rinsed in cacodylate, and finally dehydrated in an alcohol series prior to critical point drying. The observations and photographs were made by the scanning electron microscope service of the CNRS, University of Paris VI, Paris.

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## Note sur la position systématique du genre *Trichosandra* Decne. (*Asclepiadaceae*)

F. FRIEDMANN

**Résumé :** *Trichosandra borbonica* Decne., classé jusqu'à présent parmi les *Marsdenieae*, possède en réalité des anthères à 4 pollinies et doit donc être reclassé dans les *Secamoneae*. Deux espèces confondues avec *T. borbonica* et restées méconnues sont décrites dans le genre *Secamone* : *S. dilapidans* et *S. rodriguesiana*.

**Summary :** The genus *Trichosandra* Decne., previously included in *Marsdenieae*, must be placed in *Secamoneae*, having 4 pollinia in each anther. Among the specimens mixed with *T. borbonica*, two other species are here described under *Secamone* : *S. dilapidans* and *S. rodriguesiana*.

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Décrit par DECAISNE en 1844, *Trichosandra* est classé par lui avec les « *Asclepiadeae verae* » dans les *Marsdenieae* c'est-à-dire avec des genres caractérisés par les anthères et les pollinaires à 2 pollinies. BENTHAM & HOOKER (1876), BAILLON (1891), SCHUMANN (1897) maintiennent ce classement et MARAIS (1985) ne le remet pas en question.

Cependant, l'examen des fleurs montre que, d'une part, *Trichosandra* doit être classé dans les *Secamoneae* car les anthères renferment 4 pollinies et que, d'autre part, 3 espèces distinctes ont été confondues sous *T. borbonica*. La présence de 4 pollinies par anthère peut être vérifiée chez les 3 espèces.

### 1. *Trichosandra borbonica* Decne., *sensu stricto*. — Fig. 1, 3, 10.

L'examen des syntypes de l'espèce, *Thouars s.n.* (P) et *Lépervenche-Mézières s.n.* (G-DC, microfiche), montre qu'aucun mélange n'a été fait par DECAISNE lui-même ; les 2 spécimens représentent bien la même espèce. Sa description du genre, par contre, est cependant partiellement inexacte et trop succincte ce qui a permis les confusions ultérieures.

Les principaux caractères floraux sont :

- La corolle charnue à 5 lobes épais, valvaires jusqu'au sommet, avec, à la face interne 2 bourrelets convergents et dont le tube porte à l'intérieur une fine pilosité (Fig. 1, 3, 4).
- La couronne représentée par une structure particulière, 2 crêtes formant un triangle et délimitant un creux.



— Les anthères terminées par un lobe membraneux portant sur sa marge de longs cils rayonnants. Chaque loge d'une anthère renferme 2 pollinies.

Lors de la dissection d'une fleur, les pollinaires se désarticulent le plus souvent et ne conservent que 2 pollinies (provenant chacune de 2 anthères adjacentes) collées au rétinacle. Ce n'est qu'avec beaucoup de précautions que des pollinaires à 4 pollinies peuvent être isolés (Fig. 1, 8).

Se pose alors la question des affinités de *Trichosandra* parmi les *Secamoneae*. *Genianthus* Hook. f. (1883) possède une corolle presque valvaire, les lobes se couvrant très légèrement par leur marge gauche. Mais les lobes ne sont pas aussi charnus et la présence d'une couronne bien développée interdit tout rapprochement direct avec *Trichosandra*. Il existe également à Madagascar des *Secamoneae* à corolle valvaire à lobes assez épais et charnus (*Decary 17894*, « Forêt de Sandrangato », spécimen encore indéterminé). Cette plante a aussi une couronne très développée, les lobes dorsaux des étamines dépassant le sommet des anthères. Une structure analogue à celle de *Trichosandra* existerait chez *Secamone astephana* Choux, mais d'après la description, la corolle est contortée.

En dehors des *Secamoneae* on trouve des structures coronaires approximativement de ce type chez *Marsdenia truncata* Jum. & H. Perrier (*Descoings 1920*) et chez *Pleurostelma cernuum* (Decne.) Bull. Les affinités sont dans ces cas plus lointaines.

Dans l'état actuel des connaissances de l'ensemble des *Secamoneae* (que BAILLON et SCHUMANN ont regroupées en totalité dans le genre *Secamone*) il est préférable de conserver à *Trichosandra* son statut de genre autonome monospécifique. Il est cependant nécessaire d'amender sa description.

### TRICHOSANDRA Decne.

Calice à 5 sépales coriaces à préfloraison quinconciale. Corolle sub-campanulée dépassant peu le calice, à 5 lobes dressés, *charnus, valvaires, à gorge et tube courtement pileux*. Couronne staminale non développée mais *réduite à 5 petites dépressions triangulaires*. Gynostège presque égal au tube de la corolle. Anthères terminées par une membrane blanche à marge pileuse-dilacérée. *Pollinies 4 dans chaque anthère*, dressées, ovales-oblongues, fixées à la base. Stigmate sub-hémisphérique. Follicules lisses, lignifiés. Graines à touffe de soies.

*Genre de la tribu des Secamoneae*

Espèce unique : *T. borbonica* Decne.

Je n'ai vu que des échantillons réunionnais de cette espèce. Elle semble avoir toujours été rare. Il est intéressant de noter qu'un des syntypes a été récolté vers 1830 par MÉZIÈRES-LÉPERVENCHE qui semble s'être fait une spécialité des espèces très rares de l'île Bourbon. (Il est aussi le seul à avoir découvert, à l'époque, *Pisonia lanceolata* Poir., une espèce si rare que l'on a

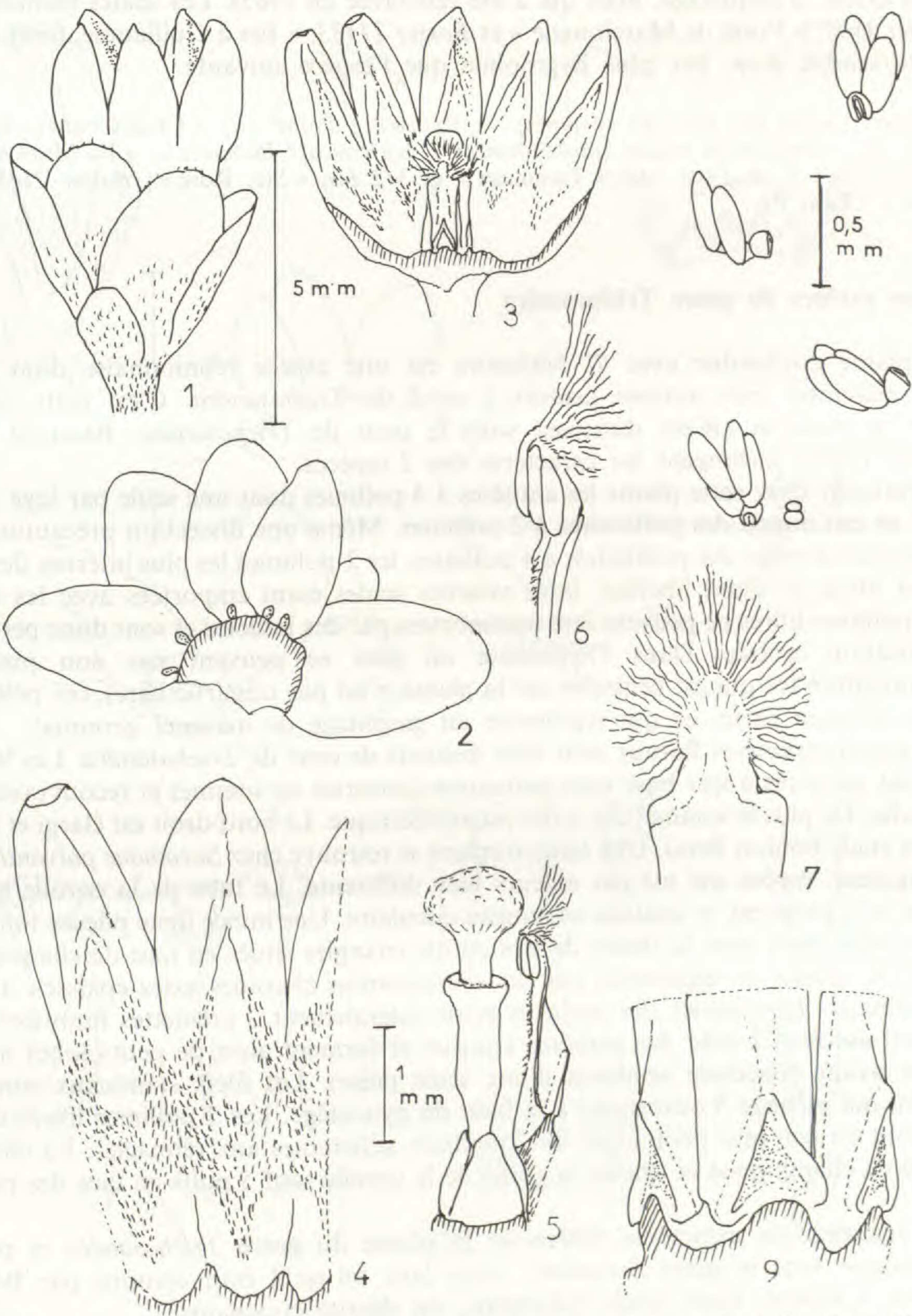


Fig. 1. — *Trichosandra borbonica* : 1, fleur en début d'anthèse (un peu aplatie en herbier); 2, calice étalé; 3, corolle étalée; 4, fragment de corolle montrant la pilosité à l'intérieur du tube; 5, pistil et 1 étamine isolés; 6, sommet d'une étamine en vue latérale, montrant les 2 pollinies dans une des 2 loges de l'anthère; 7, sommet d'anthère en vue externe; 8, pollinaires à 4 pollinies vus sous divers angles; 9, base de la corolle staminale montrant la structure coronaire. (6 à 9 même grossissement). Potier s.n., P.